AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently amended): A diagnostics and control system for controlling a motorized system and diagnosing the health thereof, comprising:

a controller operatively associated with the motorized system and adapted to operate the motorized system in a controlled fashion; and

a diagnostics system operatively associated with the motorized system and adapted to diagnose the health of the motorized system according to a measured attribute associated with the motorized system, the diagnostics system providing a diagnostic signal to the controller.

2. (Original): The diagnostics and control system of claim 1, wherein the measured attribute comprises at least one of vibration, pressure, current, speed, and temperature.

3. (Original): The diagnostics and control system of claim 1, wherein the motorized system comprises a motor and a load, and wherein the load comprises at least one of a valve, a pump, a conveyor roller, a fan, a compressor, and a gearbox.

4. (Original): The diagnostics and control system of claim 1, wherein the diagnostics system provides a diagnostics signal according to the health of the motorized system, and wherein the controller provides a control signal to the motorized system according to at least one of a setpoint and the diagnostics signal.

5. (Original): The diagnostics and control system of claim 1, wherein the measured attribute comprises at least one vibration signal obtained from a sensor associated with a motor in the motorized system.

6. (Original): The diagnostics and control system of claim 5, wherein the diagnostics system is adapted to diagnose the health of at least one of a motor bearing, motor shaft alignment, and motor mounting according to the measured vibration.

7. (Original): The diagnostics and control system of claim 6, wherein the diagnostics system is adapted to perform frequency spectral analysis of the vibration signal.

8. (Original): The diagnostics and control system of claim 7, wherein the diagnostics system comprises at least one of a neural network and an expert system, and wherein the diagnostics system provides a diagnostics signal indicative of the health of the motorized system according to frequency spectral analysis of the measured vibration signal using the at least one of a neural network and an expert system.

9. (Original): The diagnostics and control system of claim 8, wherein the controller provides a control signal to the motorized system according to at least one of a setpoint and the diagnostics signal.

10. (Original): The diagnostics and control system of claim 1, wherein the motorized system comprises a motorized pump, wherein the measured attribute comprises at least one vibration signal obtained from a sensor associated with the pump, and wherein the diagnostics system is adapted to diagnose the health of the pump according to the measured vibration.

11. (Original): The diagnostics and control system of claim 10, wherein the diagnostics system is adapted to perform frequency spectral analysis of the vibration signal.

12. (Original): The diagnostics and control system of claim 11, wherein the diagnostics system comprises at least one of a neural network and an expert system, and wherein the diagnostics system provides a diagnostics signal indicative of the health of the pump according to frequency spectral analysis of the measured vibration signal using the at least one of a neural network and an expert system.

13. (Original): The diagnostics and control system of claim 12, wherein the controller provides a control signal to the motorized system according to at least one of a setpoint and the diagnostics signal.

14. (Original): The diagnostics and control system of claim 12, wherein the diagnostics system employs data fusion techniques in order to derive the at least one vibration signal from at least one sensor associated with the motorized system.

15. (Original): The diagnostics and control system of claim 1, wherein the motorized system comprises a motorized pump, wherein the measured attribute comprises a current associated with a motor in the motorized system, and wherein the diagnostics system provides a diagnostics signal indicative of pump cavitation according to the measured current.

16. (Original): The diagnostics and control system of claim 15, wherein the diagnostics system comprises a neural network adapted to synthesize a change in condition signal from the measured current.

17. (Original): The diagnostics and control system of claim 16, wherein the diagnostics system comprises:

a preprocessing portion operatively coupled to the neural network, the preprocessing portion adapted to condition the measured current prior to inputting the current into the neural network; and

a post processing portion operatively coupled to the neural network, the post processing portion adapted to determine whether the change in condition signal is due to a fault condition related to the motorized system.

18. (Original): The diagnostics and control system of claim 17, wherein the post processing portion is a fuzzy rule based expert system.

19. (Original): The diagnostics and control system of claim 18, wherein the diagnostics system is adapted to detect at least one fault relating to the operation of the pump and at least one fault relating to the operation of the motor driving the pump according to the measured current.

20. (Original): The diagnostics and control system of claim 1, wherein the diagnostics system is adapted to obtain a space vector angular fluctuation from a current signal relating to operation of the motor, and to analyze the space vector angular fluctuation in order to detect at least one fault in the motorized system.

21. (Original): The diagnostics and control system of claim 20, wherein the diagnostics system is adapted to obtain a current signal associated with the motor, to calculate a space vector from the current signal, to determine a space vector angular fluctuation from the space vector, and to analyze the space vector angular fluctuation in order to detect the at least one fault associated with the motor.

22. (Original): The diagnostics and control system of claim 21, wherein the diagnostics system is adapted to sample first, second, and third phase current signals associated with the motorized system in order to obtain the current signal, to calculate first, second, and third phase space vectors according to the first, second, and third phase current signals, respectively, and to calculate the space vector by summing the first, second, and third phase space vectors, in order to calculate the space vector from the current signal.

23. (Original): The diagnostics and control system of claim 22, wherein the diagnostics system is adapted to perform a comparison of the space vector with a reference space vector, wherein the reference space vector is a function of a constant frequency and amplitude, and to compute angular fluctuations in the space vector according to the comparison, in order to determine the space vector angular fluctuation.

24. (Original): The diagnostics and control system of claim 23, wherein the diagnostics system is adapted to compute a polynomial expansion of an arctangent function in order to compute angular fluctuations in the space vector.

25. (Original): The diagnostics and control system of claim 24, wherein the diagnostics system is adapted to perform frequency spectrum analysis of the space vector angular fluctuation in order to analyze the space vector angular fluctuation in order to detect at least one fault associated with the motorized system.

26. (Original): The diagnostics and control system of claim 25, wherein the diagnostics system is adapted to compute a frequency spectrum of the space vector angular fluctuation, and to analyze the amplitude of a first spectral component of the frequency spectrum at a first frequency in order to perform frequency spectrum analysis of the space vector angular fluctuation.

27. (Original): The diagnostics and control system of claim 26, wherein the diagnostics system is adapted to analyze fluctuations in amplitude of the first spectral component in order to detect at least one fault associated with the motorized system.

28. (Original): The diagnostics and control system of claim 27, wherein the first frequency is approximately twice the frequency of power applied to a motor in the motorized system.

29. (Original): The diagnostics and control system of claim 28, wherein the diagnostics system is adapted to use a Goertzel algorithm to extract the amplitude of the first spectral component in order to analyze the amplitude of the first spectral component.

30. (Original): The diagnostics and control system of claim 29, wherein the at least one fault comprises at least one of a stator fault, a rotor fault, and an imbalance in the power applied to the motor in the motorized system.

31. (Original): The diagnostics and control system of claim 1, wherein the diagnostics system comprises at least one of a neural network, an expert system, and a data fusion component.

32. (Currently amended): A method of controlling a motorized system and diagnosing the health thereof, comprising:

operating a motor in the motorized system in a controlled fashion; ~~and~~

diagnosing the health of the motorized system according to a measured attribute associated with the motorized system; and

generating a diagnostics signal communicated to a controller.

33. (Original): The method of claim 32, further comprising providing a diagnostics signal indicative of the health of the motorized system, wherein operating the motor comprises controlling the motor according to at least one of a setpoint and the diagnostics signal.

34. (Original): The method of claim 33, further comprising measuring an attribute associated with the motorized system, wherein providing the diagnostics signal comprises obtaining a frequency spectrum of the measured attribute and analyzing the frequency spectrum in order to detect at least one fault in the motorized system.

35. (Original): The method of claim 34, wherein providing the diagnostics signal comprises computing a space vector angular fluctuation, obtaining a frequency spectrum of the space vector angular fluctuation, and analyzing the amplitude of a first spectral component of the frequency spectrum at a first frequency.

36. (Original): The method of claim 32, wherein diagnosing the health of the motorized system according to a measured attribute associated with the motorized system comprises:

providing the measured attribute to at least one of a neural network, an expert system, and a data fusion component; and

providing a diagnostics signal indicative of the health of the motorized system from the at least one of a neural network, an expert system, and a data fusion component.

37. (Original): The method of claim 36, wherein operating the motor comprises controlling the motor according to at least one of a setpoint and the diagnostics signal.

38-40. (Cancelled)

41. (Original): An integrated control and diagnostics system for a motor, the system comprising:

a diagnostics module to generate a health assessment signal indicative of the health of the motor;

a controller coupled to the motor, said controller outputting a driving output based on said health assessment signal, wherein said driving output is applied to the motor.

42. (Currently amended): The control and diagnostics system according to claim 41, wherein said diagnostics module generates said health assessment signal at least partially based on said driving output produced by said controller.

43. (Original): The control and diagnostics system according to claim 41, wherein said controller is associated with at least one controllable parameter, said parameter being controllable in response to said health assessment signal.

44. (Cancelled)

45. (Original): The control and diagnostics system according to claim 41, further including at least one sensor, said sensor generating a signal indicative of a parameter associated with the motor, wherein the health assessment signal is based on the sensor signal.

46. (Original): The control and diagnostics system according to claim 45, wherein said controller includes a velocity feedback loop and a torque feedback loop.

47. (Original): The control and diagnostics system according to claim 46, wherein said velocity feedback loop generates a current reference signal in response to the sensor signal, and said torque feedback loop generates the driving output in response to the current reference signal.

48. (Original): The control and diagnostics system according to claim 47, wherein said velocity feedback loop includes a P-I controller to generate the current reference signal.

49. (Original): The control and diagnostics system according to claim 45, wherein said motor parameter is one of a group consisting of velocity and vibration.

50-52. (Cancelled)

53. (Original): The control and diagnostics system according to claim 41, wherein said diagnostics module includes an ASIC that generates the health assessment signal based on a process constraint.

54. (Original): The control and diagnostics system according to claim 42, wherein said health assessment signal is indicative of whether the motor is deviating from a normal operating characteristic.

55. (Original): The control and diagnostics systems according to claim 41, further comprising a coordination module coupled to a plurality of the control and diagnostics systems, wherein said coordination module alters the driving output associated with one of the control and diagnostics systems based on the driving output of another one of the control and diagnostics systems.

56. (Cancelled)